Biological Evaluation/Biological Assessment

For

Threatened, Endangered, Proposed and Sensitive (TES) Species

Fox Creek Stream Restoration Project

Grayson County, Virginia

Mount Rogers National Recreation Area

George Washington and Jefferson National Forests

Introduction

Forest Service Manual (FSM) Section 2672.41 requires a biological evaluation (BE) and/or biological assessment (BA) for all Forest Service planned, funded, executed, or permitted programs and activities. The objectives of this BE/BA are to: 1) ensure that Forest Service actions do not contribute to loss of viability of any native or desired non-native species or contribute to trends toward federal listing, 2) comply with the requirements of the Endangered Species Act (ESA) so that federal agencies do not jeopardize or adversely modify critical habitat (as defined in ESA) of federally listed species, and 3) provide a process and standard to ensure that threatened, endangered, proposed, and sensitive species receive full consideration in the decision-making process using the best available science.

The Mount Rogers Ranger District supports known occurrences and suitable habitat for several TES species, all of which were considered in this analysis. This BE/BA documents the analysis of potential impacts of the proposed project to TES species and associated habitat. It also serves as biological input into the environmental analysis for project-level decision-making to ensure compliance with the ESA, National Environmental Policy Act (NEPA), and National Forest Management Act (NFMA).

Project Area and Effects Analysis Area

The Mount Rogers National Recreation Area is proposing to improve approximately 5800 feet of Fox Creek within Fairwood Valley. This area is north of State Routes 603. The proposed project is just over a mile to the west Troutdale, VA in Grayson County. The proposed stream restoration would occur in phases over the next 10 years.

Figure 1. Fox Creek Restoration Project Area

Proposed Management Actions

The overall purpose of the action is to benefit riparian and aquatic habitat and the management of fisheries populations and riparian dependent species of Fox Creek. The project site is inside a forest service grazing allotment in Fairwood Valley and acquired by the forest service between 1968 and 1973. The land along Fox Creek was used for farming and grazing of livestock which resulted in damage to the stream channel and banks. This area is part of the fairwood grazing allotment and is currently grazed with cattle.

This project will establish floodplain connectivity at the bank-full elevation, stabilizing streambanks at a 3:1 slope, with native riparian vegetation, matting and live staking. In-stream structures made of large woody material and rock will be used for grade control, streambank protection and habitat complexity. Wetland areas will be re-established in the riparian area and floodplain. The project will be completed in segments, as funding is available, starting with the most upstream segment between Fairwood Cemetery Rd bridge and 603 bridge. The area is used by many trout anglers, hunters, and the grazing permittee.

Species Reviewed

Analysis of the proposed action was conducted using the best available science, including references from science-based websites, books, papers, reports, state and federal databases, field surveys, and professional opinions. Information from field visits, project area habitat conditions, species habitat requirements, species distributions, the George Washington and Jefferson National Forests step down process (see Appendix A) and a species list USFWS IPAC system were used to determine what species were likely to occur in the project area. The forest's GIS database was also examined to locate any records of threatened or endangered species in the project area or vicinity.

An official species list was requested from the USFWS IPAC system and was receive on July 19,2021. The IPAC system identified 3 species that are known to occur within the county where the project is located and 12 sensitive species were identified using the forests' "OAR step down" process. However, some of the species identified in IPAC are either not located in the same watershed, a very far downstream of the project area, do not have suitable habitat in the project area, or have no known occurrences in the project area. See Table 1 for species considered and included/excluded from further analysis in this biologist assessment. For species excluded from further analysis, it was determined that the proposed project would have **no effect** on them because they either are unlikely to occur within the project area, are far enough downstream to not be affected by project implementation, or do not have suitable habitat present in the project area.

Table 1. Threatened and endangered species identified by the USFWS IPAC system and rationale for consideration in this analysis.

Common Name	Scientific Name	Status	Species Type	Considered but Excluded from further Analysis	Considered Further in the BA
Indiana Bat	*Myotis sodalis*	Endangered	Mammal		✓
Northern Long-eared Bat	*Myotis septentrionalis*	Threatened	Mammal		✓
Rock Gnome Lichen	*Gymnoderma lineare*	Endangered	Lichen	✓[2]	

Notes:
[1] Project areas are not within the species' known range or watershed on the Mount Rogers National Recreation Area.
[2] Project areas are not currently appropriate or potentially appropriate habitat for the species.

Table 2. Sensitive species identified by the OAR step up system (Appendix A) and code given

Common Name	Scientific Name	Status	Species Type	OAR Code
Eastern small-footed Bat	*Myotis leibii*	Sensitive	Mammal	6

Tricolored Bat	*Perimyotis subflavus*	Sensitive	Mammal	6
Cryptic willowfly	*Taeniopteryx nelsoni*	Sensitive	Stonefly	6
Monarch	*Danaus plexippus*	Sensitive	Butterfly	6
A liverwort	*Nardia lescurii*	Sensitive	Liverwort	6
White-trailing Monkhood	*Aconitum reclinaturm*	Sensitive	Vascular Plant	6
Mountain Bittercress	*Cardamine clemtitis*	Sensitive	Vascular Plant	6
Cutberth's Turtlehead	*Chelone cuthbertii*	Sensitive	Vascular Plant	6
Glade Spurge	*Euphorbia purpurea*	Sensitive	Vascular Plant	6
Long-stalked Holly	*Ilex collina*	Sensitive	Vascular Plant	6
Butternut	*Juglans cinerea*	Sensitive	Vascular Plant	6
Bog Bluegrass	*Poa paludigena*	Sensitive	Vascular Plant	6

Effects of Proposed Management Action on Each Identified Species

The analysis of possible effects to species identified as known or expected to occur in the vicinity of the proposed project, or likely to be impacted by the action includes the following existing information:

- Data on species/habitat relationships
- Species range distribution
- Occurrences developed from past field surveys or field observations
- The amount, condition, and distribution of suitable habitat

Effects to Threatened, Endangered, and Sensitive Species

Indiana Bat

Introduction

The overall range of this species extends from eastern Oklahoma north to Wisconsin and Michigan, east to New England, and south to northern Alabama (Natureserve, 2020). The distribution of Indiana bats is generally associated with limestone caves in the eastern U.S., and within this range, they occupy two distinct types of habitat. During winter, Indiana bats hibernate in caves referred to as hibernacula. Bats are often readily found and easily counted during this hibernation period. Census of hibernating Indiana bats is the most reliable method of tracking population trends range-wide, and winter distribution of the Indiana bat is well documented (USDA FEIS, 2014).

When not in hibernation Indiana Bats forage primarily for winged insects in wooded and semi-wooded habitats utilizing snags, hollow trees, and trees with loose bark as their preferred roost sites (Natureserve, 2020). Adults primarily forage within three miles of the occupied maternity roost. Maternity colonies of more than 100 adult females can be found roosting together under sloughing bark of dead and partially dead trees in forested settings (Callahan et al. 1997). Reproductive females may require multiple alternate roost trees to fulfill summer habitat needs.

Swarming of both males and females and subsequent mating activity occurs at cave entrances prior to hibernation. During this autumn swarming period, bats roost under sloughing bark and in cracks of dead, partially dead, and live trees in proximity to the cave used for hibernation (USDA FEIS, 2014). Indiana bat is one of the species effected by White Nose Syndrome (WNS) and has declined across its range due to fungus infections. Hibernacula and summer roost protection are critical to the survival of this species.

There is currently no critical habitat for this species, known hibernacula or known summer roost sites within the project area.

Effects to the federally endangered Indiana bat (*Myotis sodalis*) were considered in this BE/BA because it is assumed the entire Forest is potential habitat for this species. See USFWS's Biological Opinion (BO) of January 13, 2004 and this agency's Final Environmental Impact Statement and Record of Decision for the Revised Land and Resource Management Plan, herein referred to as the Jefferson Forest Plan.

Direct, Indirect, and Cumulative Effects

Effects to the federally endangered Indiana bat were considered in this BE/BA because it is assumed the entire Forest is potential habitat for this species. Potential habitat (mature forests with trees having exfoliating or deeply fissured bark) exists in the proposed project area. Although in general the activities associated with this project will not remove or disturb this roosting habitat, there will be some disturbance to tree species of the size and type known to be used by the Indiana bat. Because all log, root-wad, and large woody debris materials for the project will be derived on-site, some potential roost trees will be removed from the project area.

During the proposed associated activity of the project, the immediate removal of 30-40

hardwood trees greater than 9" dbh would occur scattered across approximately twenty acres. This would result in some very minor loss of potential Indiana bat roost trees, and indirectly, the potential but very unlikely loss of individual bats.

This project-level analysis follows direction in the Jefferson National Forest's Revised Forest and Land Resource Management Plan (Forest Plan) and Final Environmental Impact Statement (FEIS) and is in compliance with applicable Indiana Bat Standards FW-45 to FW-60. This analysis includes, and is in addition to, the entire Indiana bat effects analysis (pages 3-180 through 3-184) documented in the Forest Plan EIS. Because of its length, the Forest Plan's discussion is not repeated here. However, findings of that analysis concluded that individual bats might be killed or harmed by such activities as associated with this project. The U. S. Fish and Wildlife Service has determined that such take, within authorized levels, would be incidental take, and would not result to jeopardy to the Indiana bat. The acreage proposed here for collection of large woody material for the project represents approximately 0.01% of the allowable amount of habitat disturbance (estimated at up to 16,800 acres per year on the JNF) under the incidental take provisions of the Jefferson Plan Revision Biological Opinion.

The USFWS supported the determination for the Indiana bat as follows: in the January 13, 2004 USFWS's Biological Opinion concerning the Indiana bat on the Forest, the following conclusion was reached:

"After reviewing the current range-wide status of the Indiana bat, the environmental baseline for the action area, the effects of forest management and other activities on the JNF as described in the 2004 Revised Land and Resource Management Plan, and the cumulative effects, it is the FWS's biological opinion that implementation of forest management and other activities authorized as specified in the Jefferson Land and Resource Management Plan are not likely to jeopardize the continued existence of the Indiana bat. Critical habitat for this species has been designated in Kentucky, Tennessee, Illinois, Missouri, and West Virginia. However, this action does not affect those areas and no destruction or adverse modification of that critical habitat will occur as a result of JNF management activities."

For the Indiana bat, this project will be in compliance with the BO issued by the USFWS on January 13, 2004 for future actions covered by the Jefferson National Forest Land & Resource Management Plan. The USFWS states in the BO that it will constitute compliance with ESA Section 7 consultation requirements for future actions provided that those actions are carried out in compliance with all the requirements contained in the BO. Since implementation of this project will follow and incorporates the BO that was issued as a result of formal consultation and it provides both specific Plan and project level direction and incidental take is not exceeded, a finding of the effect to the Indiana bat for this proposed project is "may affect, likely to adversely affect" as was stated in the programmatic Jefferson Forest Plan level Biological Assessment and no additional formal consultation required. The effects of the proposed project activities are likely to adversely affect the Indiana bat; however, the activities connected with this project are consistent with those covered by previous formal consultations (USFS 2003, FWS 2004). As a result of those previous consultations, the Fish and Wildlife Service issued a non-jeopardy Biological Opinion (FWS 2004) establishing annual incidental take authorizations of 16,800 acres of activities including timber sales, road construction, prescribed burning, control line construction, development and maintenance of recreational areas, special uses, etc. This project would utilize no more than 2 acres of incidental take associated with these activities. As such, we believe this project is consistent with previous formal consultations and no additional formal

consultation is required.

Other than the proposed activities, there are no foreseeable activities in the areas that would directly or indirectly affect the Indiana bat. Therefore, there will be no cumulative effects to the Indiana bat from the proposed project other than the effects disclosed above.

Determination of Effects

Implementing this propose action may affect but is **likely to adversely affect** this species but these actions are covered under the incidental take given in the Forest BO.

Northern Long-eared Bat

Introduction

This species was listed as threatened on April 2, 2015 due to rapid population declines caused by White Nose Syndrome (WNS). The range of the northern long-eared bat includes much of the eastern and north central United States, and all Canadian provinces from the Atlantic Ocean west to the southern Yukon Territory and eastern British Columbia. In Virginia, the Northern Long-eared bat (NLEB) was known to occur in every county of the state and prior to WNS was the most commonly captured bat in summer mist-net surveys.

The NLEB is insectivorous and migratory, hibernating in caves and mines during the winter and occupying forests in the summer for feeding and reproduction (USDI, 2016). They typically use large caves or mines with large passages and entrances, constant temperatures, and high humidity with no air currents. Specific areas where they hibernate have very high humidity, so much so that droplets of water are often seen on their fur. During winter hibernation in hibernaculum, NLEB are difficult to locate in bat survey efforts (pers. Com. With Rick Reynolds, VDGIF 2019). In hibernacula they are found in small crevices or cracks, often with only the nose and ears visible.

During summer, northern long-eared bats roost singly or in colonies often in cavities, or in crevices, of both live and dead trees. This bat seems opportunistic in selecting roosts, using tree species based on suitability to provide cavities or crevices. It has also been found, rarely, roosting in structures like barns and sheds. In late spring pregnant females fly to summer areas where they roost in small colonies and give birth to a single pup. Maternity colonies, with young, generally have 30 to 60 bats, although larger maternity colonies have been observed (USDI 2015b, USDI 2016). Most females within a maternity colony give birth around the same time, which may occur from late May or early June to late July, depending where the colony is located within the species' range. Young bats start flying by 18 to 21 days after birth. Adult northern long-eared bats can live up to 19 years. Northern long-eared bats emerge at dusk to fly through the understory of forested hillsides and ridges feeding on moths, flies, leafhoppers, caddisflies, and beetles, which they catch while in flight using echolocation. This bat also feeds by gleaning motionless insects from vegetation and water surfaces (USDI 2015b, USDI 2016).

Direct, Indirect, and Cumulative Effects

During the collection of large woody material for the project, the immediate removal of approximately 30-40 hardwood trees greater than 9" dbh will occur scattered across approximately twenty acres which would result in some very minor loss of potential roost trees. Overall the activities should create favorable foraging throughout the project area and the small openings created by the removal of a few trees will create edges potentially favored by roosting females. The riparian area plantings within the project area will also create early successional and edge habitats that would benefit the northern long-eared bat. Therefore, there should be no cumulative negative effects to the northern long-eared bat.

Across the Forest based on the positive action of closing caves and mines, the habitat objectives to maintain a variety of successional ages within a predominantly mature forest structure, and the current standards put in place to protect cave and karst locations along with specific management standards for the Indiana bat, we do not believe there is any likelihood that the management activities implemented as part of this project will jeopardize the continued existence of the northern long-eared bat.

With the recent published final rule the USFWS determined "threatened" status for the northern long-eared bat. The official listing of the northern long-eared bat as "threatened" became effective on May 4, 2015. The Service also established an interim rule under the authority of section 4(d) of ESA that includes measures to provide for the conservation of the northern long-eared bat. The interim 4(d) rule provides the provisions to allow incidental take under certain conditions. For this project, take is exempted by the 4(d) rule because forest management practices include the following measures: (i) Activity occurs more than 0.25 mile (0.4 km) from a known, occupied hibernacula, (ii) Activity avoids cutting or destroying known, occupied roost trees during the pup season (June 1–July 31), (iii) Activity avoids clearcuts (and similar even-aged harvest methods, e.g. seed tree, shelterwood and coppice) within 0.25 mile (0.4 km) of known, occupied roost trees during the pup season (June 1–July 31). Therefore with this minimal tree removal project in compliance with the interim 4(d) rule the Service states that the incidental take that may result from this project is exempted by the 4(d) rule and no further action is necessary to comply with ESA prohibitions to protect northern long-eared bats. There are no additional foreseeable activities in the area that would directly or indirectly affect the northern long-eared bat. Therefore, there will be no cumulative effects to the northern long-eared bat from the proposed project.

Determination of Effects

Implementing this propose action may affect but is **likely to adversely affect** this species, but project actions are covered under the 4D rule.

Eastern small-footed Bat (*Myotis leibii*)

Introduction

Effects to Eastern small-footed bat were considered in this BE/BA because Wythe and Smyth Counties, VA are listed as likely to support occurrences of the small-footed bat and habitat features found in the project area could be utilized by this species. This species is known or likely to occur in 32 Virginia counties and ranges from New England south to northern Georgia

and west to Oklahoma. During winter this species hibernates in caves and during late spring, summer, and early fall, Eastern small-footed bats forage at night in forest and open woodland habitat, usually along ridge crests, and roost during the day in crevices of large rock outcrops, boulderfields, and cliffs (also in man-made structures such as expansion-joints of concrete bridges). Therefore, eastern small-footed bats are potentially present and roosting during summer months wherever large rock outcrops or cliffs are present. Potential habitat consisting of large rock outcrops and cliffs exist in the general project area.

Direct, Indirect, and Cumulative Effects

During the collection of large woody material for the project, the immediate removal of approximately 30-40 hardwood trees greater than 9" dbh will occur scattered across approximately twenty acres which would result in some very minor loss of potential roost trees. Overall the activities should create favorable foraging throughout the project area and the small openings created by the removal of a few trees will create edges potentially favored by roosting females. The riparian area plantings within the project area will also create early successional and edge habitats that would benefit this species. Therefore, there should be no cumulative negative effects to this species.

Across the Forest based on the positive action of closing caves and mines, the habitat objectives to maintain a variety of successional ages within a predominantly mature forest structure, and the current standards put in place to protect cave and karst locations along with specific management standards for the Indiana bat, we do not believe there is any likelihood that the management activities implemented as part of this project would jeopardize the continued existence of this species.

Determination of Effects Determination of Effects

Implementation of the project **may impact individuals** but **is not likely to cause a trend towards federal listing** of this species because indirect impacts and cumulative impacts would improve the foraging conditions for this species.

Tricolored bat (*Perimyotis subflaus*)

Introduction

Effects to tricolored bats were considered in this BE/BA because this area is likely to support occurrences of the tricolored bat and habitat features found in the project area could be utilized by this species. Tricolored bats have a widespread range across the eastern United States and southeastern Canada, south into Central America, extending west into the central Great Plains. This bat occurred commonly across Virginia and West Virginia in summer and during migration (NatureServe 2020). Once one of our most common bat species, tricolored bats have experienced substantial declines across Virginia and West Virginia, since the discovery of white-nosed syndrome (WNS) in 2009. In Virginia, winter hibernacula monitoring surveys have documented

are more than 95% decline across the State. It is now State listed as Endangered.

This species is a small bat, reaching 3½ inches in length and has a wingspan of just over 9 inches. The fur color is variable, but typically is a reddish brown to yellowish brown, slightly lighter on the belly. Its back fur is unique being tricolored -- gray at the base, tan in the middle, and dark-tipped. The wing membranes are blackish, but the skin covering the larger wing bones, including the forearm, is flesh colored.

Tricolored bats will hibernate in a variety of sites including mines, rock shelters, and quarries, but they use caves most frequently. They are typically found hanging singly from the ceiling or along a wall. The bats prefer relatively warmer and more humid portions of caves for hibernation. They often have water droplets condensed on their fur that can make them sometimes appear white when a light is shined on them. Although most summer roosting sites are unknown in Virginia or West Virginia, this species has been observed roosting in high tree foliage, often in clumps of dead leaves or needles, in tree crevices and cavities, and human constructed structures such as buildings, homes, barns, sheds and bridges. There are currently no known maternity colony or roosting sites in Virginia. At maternity colonies, one to two pups are born to each female during June. Males likely roost in trees and/or manmade structures during summer. Tricolored bats feed almost entirely on small flying insects they capture mostly along woodland edges, as well as along waterways and riparian area, near forested habitat. Suitable habitat for tricolored bat is known to occur on all GW/Jeff districts and counties.

Direct, Indirect, and Cumulative Effects

The proposed project area is outside of known high priority hibernacula for tricolored bats in Virginia (VDGIF 2016). There were no tricolored bats seen during field visits. During the collection of large woody material for the project, the immediate removal of approximately 30-40 hardwood trees greater than 9" dbh will occur scattered across approximately twenty acres which would result in some very minor loss of potential roost trees. Overall the activities should create favorable foraging throughout the project area and the small openings created by the removal of a few trees will create edges potentially favored by roosting females. The riparian area plantings within the project area will also create early successional and edge habitats that would benefit this species. Therefore, there should be no cumulative negative effects to this species.

Across the Forest based on the positive action of closing caves and mines, the habitat objectives to maintain a variety of successional ages within a predominantly mature forest structure, and the current standards put in place to protect cave and karst locations along with specific management standards for the Indiana bat, we do not believe there is any likelihood that the management activities implemented as part of this project would jeopardize the continued existence of this species.

Determination of Effects Determination of Effects

Implementation of the project **may impact individuals** but **is not likely to cause a trend towards federal listing** of this species because indirect impacts and cumulative impacts would improve the foraging conditions for this species.

Cryptic Willowfly

Currently has only been found known in a single stream, Lewis Fork in the Mt. Rogers National Recreation Area of Grayson Co. and Smyth Co., Virginia. Due to very limited data and occurrence records, population viability cannot be determined. Because this species is adapted to cold water systems, climate change and alterations to its aquatic environment including reduced or altered flow would pose threats. (NatureServe 2020).

Direct, Indirect, and Cumulative Effects

This project could have minimal, short term negative effects to this species if they are present in the project area. This species has only been found in Lewis Fork drainage upstream of the project area and due to current stream conditions (warmer water in the summertime) it is unlikely that Fox creek currently provide year round suitable habitat fore this species. If individuals were in the stream when stream work is taking place they could be lost due to movement on stream substrate. However indirect long-term impacts are expected to be beneficial for this species. Currently Fox creek is shallow in places in the project area, and the water can reach warmer temperatures around 70 degrees in the summer months reducing the habitat quality for this species. Stabilizing the channel and creating more pools would provide cooler water conditions for this projects focal species trout, a cold water species, in turn improving the habitat quality for this species as well. Cumulatively riparian fencing for the grazing cattle in the project area would further improve water conditions for this species.

Determination of Effects

Implementation of the project **may impact individuals** but is **not likely to cause a trend towards federal listing** of this species because impacts would be beneficial in the long term.

Monarch (*Danaus plexippus*)

Introduction

North America is considered the core of the monarch's range but the overall range extends through Central America into northern South America. This species can also be found on other

continents and islands several of which appear to be nonnative originating from introductions. The majority North American populations are strongly migratory, overwintering in a few dozen locations in California and Mexico then spreading to the rest of the United States and Canada during the spring and summer months. Populations is south Florida and the Gulf Coast are non migratory. The North American populations have declined significantly in the last 20 years, especially the last 10. Estimates from the overwintering sites in Mexico in 2013-2014 showed a 90% drop from the 20-year average for the eastern population. The greatest threat to this species is habitat loss in its over wintering grounds and pesticide usage (NatureServe 2020).

Milkweeds are the host plant for this species in all life stages. Most milkweeds contain cardiac glycosides which are stored in the bodies of both the caterpillar and adult. These poisons are distasteful to birds and other vertebrate predators. After tasting a Monarch, a predator might associate the bright warning colors of the adult or caterpillar with an unpleasant meal, and avoid Monarchs in the future. Adult feed on nectar from milkweeds, dogbane, lilac, red clover, lantana, thistles, goldenrods, blazingstars, ironweed, and tickseed sunflower (NatureServe 2020).

Direct, Indirect, and Cumulative Effects

This project would have minimal effects to negligible effects for this species. Currently wildlife openings and herbaceous roadsides provide the only current suitable habitat for this species in the project area. This activity would take place within a grazing allotment which does have patches of old field type habitat that would provide good habitat for this species. Adults in the project area would likely move away from the area while project activities are taking place. Due to the currently site conditions, it is unlikely that juveniles would be present in the project area because the host plant milkweed is not present there. It is present in the drier or sunny areas adjacent to the project area. Because of this minimal if any direct impacts are expected for this species. More preferred herbaceous habitat c]would be created on the restored banks indirectly benefitting this species in the short term, but would revert back to brushy or forested habitat over time. No cumulative effects are expected for this species.

Determination of Effects

Implementation of the project **may impact individuals** but is **not likely to cause a trend towards federal listing** of this species because impacts would improve foraging habitat conditions.

A Liverwort *(Nardia Lescurii)*

Introduction

Endemic to the southern Appalachians, the species distribution spans Pennsylvania, Delaware, West Virginia, Virginia, North and South Carolina, Georgia, Kentucky, Indiana, Illinois, and

Missouri. The global conservation status of this liverwort species is vulnerable. It is presumed extirpated in Delaware, is critically imperiled in Pennsylvania and Missouri, and is classified as vulnerable in North Carolina. The remaining states in its distribution are currently under review (NatureServe, 2020)[1]. This species is found growing on rocks situated on peaty soil, usually in the shade or associated with water (Hicks, 1992)[11].

Direct, Indirect, and Cumulative Effects

Individual could be destroyed due to stream restoration activities such as excavating dirt, removing trees, and reinforcing stream banks if present in the project area. However, due to the small size of the project area (approximately 20 acres) impacts are expected to be minimal to these species across their ranges.

This project would be indirectly and cumulatively beneficial to this species because it would stabilize the stream providing more consistent habitat conditions for these species. The main reason this project is being proposed is because the channel is shallow and often moves in the flood plain decreasing the quality of trout habitat in the stream. The moving of the channel relocated the streamside habitat. Channel movement could also affect streamside sensitive plants but uprooting the plants and washing them downstream.

Determination of Effects

Implementation of the project **may impact individuals** but is **not likely to cause a trend towards federal listing** of this species because impacts would improve foraging habitat conditions.

Trailing White Monkshood *(Aconitum reclinatum)*

Introduction

The trailing white monkshood occurs is endemic to the Appalachians, spanning the mountains and upper Piedmont of southwestern Pennsylvania to West Virginia, Virginia, North Carolina, and Tennessee. Found exclusively in the United States, it is classified globally as a vulnerable species. It is critically imperiled in Pennsylvania and Tennessee, and vulnerable in West Virginia, Virginia, and North Carolina. The species occurs in mixed forests at high elevations, and can be found in moist areas along streams, seeps, and coves. It is known to occur in deep mountain ravines and on greenstones in Virginia, and within moist cove forests in North Carolina. Draining and filling of wetlands are key threats to the trailing white monkshood. Logging threatens this species by causing disturbances to the soil and surrounding habitat. Excessive deer browsing is a threat because it causes soil compaction, which ultimately hinders plant strength, germination, and seedling development. Hiking and recreational vehicles also threaten this species by contributing to soil compaction and habitat disruption (NatureServe, 2020)[1].

Mountain Bittercress *(Cardamine clematitis)*

Introduction

The mountain bittercress is native to the southern Appalachians, spanning Virginia, North Carolina, Georgia, and Tennessee. Its global conservation status is listed as vulnerable. Regionally, it is critically imperiled in Virginia and Georgia, and imperiled in Tennessee and North Carolina (NatureServe, 2020)[1]. Mountain bittercress exclusively occurs in high-elevation riparian environments, approximately above 1000m in streams and seeps. It is common in northern hardwood forest communities, or in transitional areas between birch-red spruce and red spruce-Fraser fir forests (Schafale & Weakly, 1990)[23]. Threats to this species include land-use conversion, habit fragmentation, and forest management practices. The combined influences of non-native infestations, landscape changes, forest succession, and atmospheric pollution deposition may determine the long-term viability of the mountain bittercress (NatureServe, 2020)[1].

Cuthbert Turtlehead *(Chelone cuthbertii)*

Introduction

Cuthbert turtlehead has a geographic ranging extending through Virginia, North Carolina, South Carolina, and Georgia. With fewer than 100 known occurrences, it is globally identified as a vulnerable species. Cuthbert turtlehead is imperiled, vulnerable, presumed extirpated, and critically imperiled respectively in Virginia, North Carolina, South Carolina, and Georgia (NatureServe, 2020)[1]. Bogs, swampy woods, and wet meadows comprise its habitat. Primary threats to this species include encroachment of woody plant species, siltation, and altered hydrology (Gleason & Cronquist, 1991)[16]. Activities such as excessive grazing, use of off-road vehicles, logging, development, road paving, and drainage of bogs threaten this species (NatureServe, 2020)[1].

Glade Spurge *(Euphorbia purpurea)*

Introduction

Glade spurge is endemic throughout the eastern and southeastern United States. It is typically found in east Appalachian forests, but also occurs in other regions such as coastal plains. This species' geographic range includes Ohio, Pennsylvania, New Jersey, West Virginia, Maryland, Delaware, Virginia, North Carolina, and Georgia. With approximately 67 occurrences of this species throughout its range, glade spurge is classified as a vulnerable species. It is critically imperiled in Ohio, Pennsylvania, New Jersey, Delaware, Maryland, and Georgia, is imperiled in West Virginia and Virginia, and is vulnerable in North Carolina. Glade spurge is threatened by logging activities, invasive weeds, recreational activities, succession, deer browsing, and road development and maintenance (NatureServe, 2020)[1]. Mountain glades and swampy woods are key components of its habitat; glade spurge also occurs more rarely in dry or moist woods

(Gleason & Cronquist 1991)[16]. This species is primarily groundwater influenced, occurring most commonly in seepage swamps or spring seeps at the headwaters of creeks or steams. Some common associates within seepage swamps include *Polemonium vanbruntiae*, *Carex mitchelliana*, *Chyrsosplenium americanum*, and *Glyceria striata* among many others (NatureServe, 2020)[1].

Long Stalked Holly *(Ilex collina)*

Introduction

Long stalked holly is endemic to the Appalachians, where it spans West Virginia, Virginia, North Carolina, Tennessee, and Georgia. This species is rare, with approximately 30 occurrences across its range. It is classified as a vulnerable species, being imperiled in West Virginia, and critically imperiled in remaining states. Long stalked holly occurs in oligotrophic wetlands along streams at elevations between 646 and 1468m. This species is threatened by hydrological alterations, which emanate from activities such as logging and tree removal. Changes in climate also threaten long stalked holly due to its occurrence at high elevations. Common associate species include *Tsuga canadensis*, *Betula lenta*, *Ilex montana*, *Picea rubens*, and *Rhododendron maximum* (NatureServe, 2020)[1].

Butternut *(Juglans cinerea)*

Introduction

This species extends through the central, eastern, and southeastern United States; its geographic range includes Minnesota, Oklahoma, Missouri, Wisconsin, Illinois, Indiana, Kentucky, Tennessee, Ohio, West Virginia, Virginia, and North Carolina (NatureServe, 2020)[1]. Isolated populations have been documented in Arkansas, Georgia, Mississippi, Alabama, and South Carolina (Morin et al., 2018)[33]. In New England it spans New Hampshire, Vermont, New York, Massachusetts, Pennsylvania, New Jersey, Delaware, and Maryland. Although it has a widespread distribution, the conservation status for this species is vulnerable. This classification level is attributable to the spread of butternut canker, a fungal disease that has caused declines estimated at 44% of the tree population throughout its range. State conservation statuses range from critically imperiled (Minnesota, Oklahoma, Alabama, New Jersey), imperiled (Wisconsin, Illinois, Indiana, Kentucky, West Virginia, Maryland, North Carolina, South Carolina, Georgia, Mississippi), vulnerable (Michigan, Missouri, Arkansas, Tennessee, Virginia, Delaware, Vermont, New Hampshire), apparently secure (Ohio, Pennsylvania, New York, Massachusetts), and under review (Connecticut, Maine) (NatureServe, 2020)[1]. This species is known to grow in mesophytic forests, ravines, banks, stream and creek terraces, and floodplain forests. It thrives in well-drained bottomlands and floodplain soils (Gleason & Cronquist, 1991; Fernald, 1950) [16,34].

Bog Bluegrass *(Poa paludigena)*

Introduction

This species' range spans Minnesota, Wisconsin, Iowa, Illinois, Indiana, Ohio, Michigan, New York, Pennsylvania, Delaware, West Virginia, and North Carolina. It is a vulnerable species, with over 130 documented occurrences throughout its range. This species varies regionally from critically imperiled (New York, West Virginia, North Carolina), imperiled (Minnesota, Iowa, Michigan), vulnerable (Wisconsin, Indiana, Ohio, Pennsylvania), and extirpated (Illinois). Threats to bog bluegrass include drainage or inundation of its wetland habitat, agricultural runoff, and changes in water flow. It is particularly threatened by sedimentation. Bog bluegrass is also highly threatened by land-use conversion, habitat fragmentation, and forest management practices. Canopy removal, grazing, recreational activities, and invasive species are also potential threats. This species is commonly found in swamps and wet woods, often alongside algae on the forest floor (NatureServe, 2020)[1].

Because these species occur in similar habitats and respond similarly to the proposed action, effects will be discussed together

Direct, Indirect, and Cumulative Effects to Vascular Plants

Implementing the project could have minimally negative direct impacts to sensitive vascular plant species listed above if they are in the project area. All vascular plant listed above can be in mid to high elevation wet boggy habitat or streamside habitats. This is a stream restoration project would mainly affect streamside species. However, there are wetland boggy areas adjacent to the project area that may need to be driven through in order to access the stream. Plants in these areas could be trampled and crushed due to being driven over. This would be the only impacts only direct impacts on these species. Wetland vascular plants would only be impacted in the short term and would likely recover/resprout once the travel routes for the project are no longer used. Also this project area is small (approximately 20 acres) making effects to these species minimal across their ranges.

Individual sensitive plants endemic to streamside habitats could be destroyed due to stream restoration activities such as excavating dirt, removing trees, and reinforcing stream banks if present in the project area. However, due to the small size of the project area (approximately 20 acres) impacts are expected to be minimal to these species across their ranges.

This project would be indirectly and cumulatively beneficial to both wetland and streamside species because it would stabilize the stream providing more consistent habitat conditions for these species. The main reason this project is being proposed is because the channel is shallow and often moves in the flood plain decreasing the quality of trout habitat in the stream. The moving of the channel also affects the wetlands and stream sides which can lead to current wetlands drying out and new wetlands forming. If sensitive plant species are found in the current wetlands these shifts in habitat could cause individuals to perish due to shifting habitat conditions, habitat drying out. Channel movement could also affect streamside sensitive plants but uprooting the plants and washing them downstream.

Determination of Effects Determination of Effects

Implementation of the project **may impact individuals** but **is not likely to cause a trend towards federal listing** of this species because direct impacts could damage individuals, but indirect and cumulative impact would stabilize habitat conditions in the project area.

Summary of Determination of Effects to Species

Species	Scientific Name	Status	Species Type	Determination
Indiana Bat	*Myotis sodalis*	Endangered	Mammal	Likely to adversely effect, Covered in BO issued by VAFO on January 13, 2004. All R&PM plus T&C followed along with Jefferson Plan Standards for project implementation. Will not exceed incidental take provided.
Northern Long-eared Bat	*Myotis septentrionalis*	Threatened	Mammal	Likely to adversely effect. Relying upon the findings of the 1/5/2016 Programmatic Biological Opinion for Final 4(d) Rule on the Northern Long-Eared Bat and Activities Excepted from Take Prohibitions to fulfill our project-specific section 7 responsibilities.
Rock Gnome Lichen	*Gymnoderma lineare*	Endangered	Lichen	No effect
Eastern Small-footed Bat	*Myotis leibii*	Sensitive	Mammal	May impact but is not likely to cause a trend towards federal listing
Tricolored Bat	*Perimyotis subflaus*	Sensitive	Mammal	May impact but is not likely to cause a trend towards federal listing
Cryptic Willowfly	*Taeniopteryx nelsoni*	Sensitive	Stonefly	May impact but is not likely to cause a trend towards federal listing
Monarch	*Danaus plexippus*	Sensitive	Butterfly	May impact but is not likely to cause a trend towards federal listing
A liverwort	*Nardia lescurii*	Sensitive	Liverwort	May impact but is not likely to cause a trend towards federal listing
Trailing White Monkshoold	*Aconitum reclinatum*	Sensitive	Vascular Plant	May impact but is not likely to cause a trend towards federal listing
Mountain Bittercress	*Cardamine clematitis*	Sensitive	Vascular Plant	May impact but is not likely to cause a trend towards federal listing
Cuthbert Turtlehead	*Chelone cuthbertii*	Sensitive	Vascular Plant	May impact but is not likely to cause a trend towards federal listing
Glade Spruge	*Euphorbia pupurea*	Sensitive	Vascular Plant	May impact but is not likely to cause a trend towards federal listing
Long Stalked Holly	*Ilex collina*	Sensitive	Vascular Plant	May impact but is not likely to cause a trend towards federal listing
Butternut	*Juglans nigra*	Sensitive	Vascular Plant	May impact but is not likely to cause a trend towards federal listing
Bog Bluegrass	*Poa paludigena*	Sensitive	Vascular Plant	May impact but is not likely to cause a trend towards federal listing

These determinations were made by qualified staff of the George Washington and Jefferson National Forests based on the best available science and other relevant information. If new information or changed circumstances affect these determinations, forest staff will reinitiate consultation pursuant to Forest Service policies and requirements under Sect. 7 of the Endangered Species Act.

_/S/ _ *Brittany B. Phillips* _____ Date__10-18-2021_____

Brittany B. Phillips, Wildlife Biologist, Mount Rogers National Recreation Area

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APPENDIX A

OAR Step Down Process

A "step down" process was followed to eliminate species from further analysis and focus on those species that may be affected by proposed project activities. Species not eliminated are then analyzed in greater detail. Results of this step-down analysis process are displayed in the Occurrence Analysis Results (OAR) column of the table in Appendix A. First, the range of a species was considered. Species' ranges on the Forest are based on county records contained in such documents as the "Atlas of the Virginia Flora," but are further refined when additional information is available, such as more recent occurrences documented in scientific literature or in Natural Heritage databases. Many times, range information clearly indicates a species will not occur in the project area due to the restricted geographic distribution of most TES species. When the project area is outside a known species range, that species is eliminated from further consideration by being coded as OAR code "1" in the Appendix A table.

From past field surveys and knowledge of the area, and given the proposed action, those species which are analyzed and discussed further in this document are those that: a) are found to be located in the activity areas (OAR code "5"); b) were not seen during the survey(s), but possibly occur in the activity areas based on habitat observed during the survey(s) or field survey was not conducted when species is recognizable (OAR code "6"); c) for aquatic species, they are known or suspected downstream of project or activity areas and within identified geographic bounds of water resource cumulative effects analysis area (OAR code "8") and d) federally listed mussel and/or fish species known in 6th level watershed of project areas. Conservation measures from USFWS/FS Conservation Plan applied (OAR code "9").

More information on those species can be found in the determination table and species affected tables in the main body of this document. The following species are known or suspected to occur in or near the area or are potentially impacted by the proposed action and are coded OAR Code 6 or 9:

Documentation of Threatened, Endangered or Sensitive Species Occurrences for Fox Creek Stream Restoration

Coding for Occurrence Analysis Results (OAR) for 199 Species

Forest updated: May 3, 2021 (based on Region 8 Sensitive species list effective March 15, 2018)

OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
VERTEBRATE										
Fish										
1	-	X	*Ammocrypta clara*	Western sand darter	Clinch R, Powell R	Aquatic-rivers.	S	G3	S1	-
1	-	X	*Chrosomus cumberlandensis*	Blackside dace	Upper Cumberland R, Upper Powell R, Poor Fk Cumberland R, Clinch R drainage - Staunton Ck McGhee Ck	Aquatic-streams. Synonym: *Phoxinus cumberlandensis.*	T	G2	S1	S2 (KY)
1	-	X	*Erimonax monachus*	Spotfin chub	Lower N Fk Holston R. Critical Habitat: N Fk Holston R.	Aquatic-streams. Also, Turquoise shiner.	T	G2	S1	-
1	-	X	*Erimystax cahni*	Slender chub	Two sites - Powell R, Lee Co. Critical Habitat: mainstem Clinch and Powell R.	Aquatic-rivers.	T	G1	S1	-
1	-	X	*Erimystax insignis*	Blotched chub	Clinch-Powell system, S Fk Holston R	Aquatic-streams/rivers.	S	G4	S3	-
1	-	X	*Etheostoma acuticeps*	Sharphead darter	S and Middle Fk Holston R	Aquatic-rivers.	S	G3	S1	-
1	-	X	*Etheostoma cinereum*	Ashy darter	Upper Clinch R, Guest R gorge	Aquatic-rivers.	S	G2G3	S1	-
1	-	X	*Etheostoma denoncourti*	Golden darter	Four sites Clinch R, lower Copper Ck	Aquatic-rivers. Formerly: Tippecanoe darter, *Etheostoma tippecanoe*.	S	G3G4	S1	S2
1	-	X	*Etheostoma osburni*	Candy darter	Critical Habitat: Big Stony Ck, Dismal Ck, Cripple Ck (New R watershed)	Aquatic-streams.	E	G3	S1	S1
1	-	X	*Etheostoma percnurum*	Duskytail darter	Copper Ck, Clinch R	Aquatic-rivers.	E	G1	S1	-
1	-	X	*Etheostoma vulneratum*	Wounded darter	N and S Fk Holston R, Clinch R, Powell R	Aquatic-rivers.	S	G3	S2S3	-
1	-	X	*Icthyomyzon greeleyi*	Mountain brook lamprey	M, N Fk Holston R, Copper Ck, Indian Ck, Clinch R, Powell R	Aquatic-rivers.	S	G4	S2	S1
1	-	X	*Notropis ariommus*	Popeye shiner	N Fk Holston R, Clinch R, Powell R	Aquatic-rivers.	S	G3	S2S3	S2
1	X	X	*Notropis semperasper*	Roughhead shiner	Upper James R watershed above Buchanan (Cowpasture R, Jackson R, Craig Ck)	Aquatic-rivers.	S	G2G3	S2S3	-
1	-	X	*Noturus flavipinnis*	Yellowfin madtom	Lower and mid reaches of Copper Ck, Powell R. Critical Habitat: mainstem Clinch and Powell R, and Copper Ck.	Aquatic-streams.	T	G1	S1	-
1	X	X	*Noturus gilberti*	Orangefin madtom	S Fk Roanoke R watershed, Roanoke R above Salem, Craig Ck, Johns Ck, Cowpasture R	Aquatic-streams.	S	G2	S2	-
1	-	X	*Percina burtoni*	Blotchside logperch	N Fk Holston R, Clinch R, Copper Ck, Little R	Aquatic-rivers.	S	G2G3	S1	-
1	-	X	*Percina rex*	Roanoke logperch	Upper Roanoke R watershed	Aquatic-rivers.	E	G1G2	S1S2	-

OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
1	-	X	*Percina williamsi*	Sickle darter	S and N Fk Holston R above Saltville, Clinch R - Lower Copper Ck.	Aquatic-rivers. Synonym: *Percina macrocephala*.	PT	G2	S1S2	S2
1	-	X	*Phenacobius teretulus*	Kanawha minnow	Upper New R watershed	Aquatic-streams.	S	G3G4	S2S3	S1
Amphibian										
1	-	X	*Aneides aeneus*	Green salamander	Bland, Dickenson (Skegg Boulderfield), Lee, Russell, Scott, Tazewell, Washington, Wise, Wythe Cos, VA; Greenbrier, Monroe, Pendleton Cos, WV	Damp (not wet) crevices in shaded rock outcrops and ledges; beneath loose bark; in cracks of standing or fallen trees; in or under logs on ground.	S	G3G4	S3	S3
1	-	X	*Cryptobranchus alleganiensis*	Hellbender	N and S Fk Holston (Whitetop Laurel), Clinch R, Copper Ck, Powell R	Aquatic-rivers, streams.	S	G3	S2	S2
2	-	X	*Desmognathus organi*	Northern pygmy salamander	Grayson, Smyth, Washington Cos. Mt Rogers and Whitetop Mtn	Spruce-fir forests and adjacent northern hardwoods, >3600'.	S	G3	S2	-
1	-	X	*Plethodon hubrichti*	Peaks of Otter salamander	Peaks of Otter, Apple Orchard Mtn	Mixed oak, late successional with loose rocks and logs, >1800'.	S	G2G3	S2S3	-
1	X	-	*Plethodon punctatus*	Cow Knob salamander	Shenandoah Mtn, VA, WV	Mixed oak, late successional with loose rocks and logs, >2500'.	S	G3	S2S3	S1
1	X	-	*Plethodon sherando*	Big Levels salamander	Big Levels, Augusta Co	Forest and rocky talas slopes, 1900' – 3580'.	S	G2	S2	-
1	X	-	*Plethodon virginia*	Shenandoah Mountain salamander	Rockingham Co	Mature hardwood forested stands at elevations of approximately 2000' to 2800'.	S	G2G3	S2S3	SNR
2	-	X	*Plethodon welleri*	Weller's salamander	Mt Rogers and Whitetop Mtn	Spruce-fir forests and adjacent northern hardwoods.	S	G3	S2	-
Reptile										
1	X	-	*Clemmys guttata*	Spotted turtle	Maple Flats, Augusta Co, VA; Wardensville area, Hardy Co, WV	Mostly unpolluted, shallow bodies of water with a soft bottom and aquatic vegetation; small marshes, marshy pastures, bogs, fens, woodland streams, swamps, small ponds, vernal pools, and lake margins.	S	G5	S4	S1
1	X	-	*Glyptemys insculpta*	Wood turtle	Page, Rockingham, Shenandoah Cos; N Shenandoah R watershed	Along permanent streams during much of year; in summer may roam widely overland; variety of terrestrial habitats adjacent to streams, including deciduous woods, cultivated fields, and woodland bogs, marshy fields and pastures. Overwinters in streams. Synonym: *Clemmys insculpta*.	S	G3	S2	S3
10	X	X	*Pituophis melanoleucus*	Pinesnake	Historic records from Alleghany, Augusta, Botetourt, Craig, Rockingham Cos, VA: Monroe Co, WV. No current records known from GWJNF.	Xeric, pine-dominated or pine-oak woodland with open, low understory established on sandy soils; require forest openings, with level, well-drained sandy soils and little shrub cover as nesting/hibernation sites.	S	G4	SH	SH
Bird										
1	-	X	*Centronyx henslowii*	Henslow's Sparrow	Pulaski Co (Radford Arsenal). No nest records known on GWJNF.	Open fields, meadows with grass interspersed with weeds or shrubby vegetation, especially in damp or low-lying areas; un-mowed hayfields. Synonym: *Ammodramus henslowii*.	S	G4	S1B	S1B
Mammal										
1	-	-	*Corynorhinus rafinesquii*	Rafinesque's big-eared bat	Has not been found in VA but has occurred nearby in WV, KY, TN. In 1978, a large nursery colony was found in Hancock Co, TN, very close to the VA-TN border. Only possible in Lee, Scott, Washington Co.	Caves in winter, large hollow trees summer, may also use cliff-lines, buildings, and bridges in summer.	S	G3G4	-	S1

OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
1	X	X	*Corynorhinus townsendii virginianus*	Virginia big-eared bat	Summer: VA - Tazewell Co (3 caves), Highland Co (1 cave); WV - Pendleton Co (4 caves); Winter: Highland, Rockingham, Bland, Tazewell Cos (6 caves); Pendleton Co (6 caves). Largest VA population in Tazewell Co; largest WV population in Pendleton Co. Small numbers of bats (usually <10) in a few other widely scattered caves during summer months. Bath and Pulaski Co records are historic. No occupied caves currently known on GWJNF.	Resides in caves winter and summer. Short distance migrant (<40 miles) between winter and summer caves. Forages primarily on moths; foraging habitat is common (fields, forests, meadows, etc.). Forages within 6 miles of summer caves. USFWS Critical Habitat is 5 caves in WV (4 Pendleton Co, 1 Tucker Co). Closest Critical Habitat cave to GWJNF ~3 miles in Pendleton Co, WV. OAR code of "2" used when project further than 6 miles from summer or winter occupied cave. Synonym: *Plecotus townsendii virginianus.*	E	G3G4T2	S1	S2
2	-	X	*Glaucomys sabrinus coloratus*	Carolina northern flying squirrel	Mt Rogers and Whitetop area	Spruce-fir forests and adjacent northern hardwoods.	E	G5T2	S1	-
1	X	-	*Glaucomys sabrinus fuscus*	Virginia northern flying squirrel	Laurel Fork area, Highland Co	Spruce forests and adjacent northern hardwoods.	S	G5T2T3	S1	S2
1	-	X	*Myotis grisescens*	Gray bat	Ridge & Valley, Clinch R watershed; Russell Fk at Russell Fk/Pound R confluence.	Caves winter and summer, forages widely.	E	G4	S1	-
6	X	X	*Myotis leibii*	Eastern small-footed bat	Blue Ridge, Ridge & Valley, Cumberland Mtns	Hibernates in caves during winter, roosts in crevices of large rock outcrops, cliffs, and under large rocks in talus and boulder-fields during summer, plus similar man-made structures like rip-rap and bridges, forages widely in all forested and open habitat types over both ridges and valleys.	S	G4	S2	S1
6	X	X	*Myotis septentrionalis*	Northern long-eared bat	Blue Ridge, Ridge & Valley, Cumberland Mtns	Hibernates in crevices and cracks of cave walls during winter (sometimes mines and tunnels), difficult to find and rarely seen. During summer, forages widely and roosts singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees. Also may roost in structures like barns, sheds, and houses. Decline due to WNS.	T	G1G2	S1S3	S1S2
6	X	X	*Myotis sodalis*	Indiana bat	Blue Ridge, Ridge & Valley, Cumberland Mtns	Caves winter, upland hardwoods summer, forages widely along riparian areas and open woodlands.	E	G2	S1	S1
6	X	X	*Perimyotis subflavus*	Tricolored bat	Every county in VA, WV, KY	Caves in winter: Caves, trees, cliffs, barns during summer months. Decline due to WNS. Also, Eastern pipistrelle. Synonym: *Pipistrellus subflavus*.	S	G2G3	S1S3	S2
INVERTEBRATE										
Snail (Mollusk, Class Gastropoda)										
1	X	-	*Fontigens tartarea*	Organ cavesnail	Rock Camp Cave (1 mile from FS), McClung-Zenith Cave (1.5 mile from FS), Monroe Co, WV; Greenbrier, Pocahontas, Randolph, Tucker Cos, WV; Bath, Highland Cos, VA	Caves. Obligate troglobite.	S	G2	S1S2	S2
10	-	-	*Gastrodonta fonticula*	Appalachia bellytooth	No known records on GWJNF. Scott and Wise Co records need to be verified.	Damp, wooded environments, particularly in deep piles of wet leaf litter and around rotting wood debris.	S	G3G4	S1S3	S2
1	X	X	*Glyphyalinia raderi*	Maryland glyph	Alleghany, Montgomery Cos	Calciphile; edge of seeps within leaf litter. May burrow.	S	G2	S1S2	SH
1	X	-	*Helicodiscus diadema*	Shaggy coil	Alleghany Co	Calciphile; semi-open, calcium-rich environments, especially limestone rubble/talus and thinly wooded limestone hills.	S	G1	S1	-
1	X	X	*Helicodiscus triodus*	Talus coil	Alleghany, Botetourt, Rockbridge Cos	Calciphile; limestone rubble on wooded hillsides and near cave entrances.	S	G2	S1S2	SH

OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
1	-	X	*Io fluvialis*	Spiny riversnail	Clinch R, N Fk Holston R	Aquatic-rivers.	S	G2	S2	-
10	-	-	*Paravitrea septadens*	Brown supercoil	No known records on GWJNF. Breaks Interstate Park, Dickenson Co; Buchanan Co, VA.	Steep forested slopes and in ravines, often among woody debris, rocks, or deeper leaf litter; mixed eastern hemlock-hardwood forest, also in richer hardwood stands.	S	G1	S1	-
10	-	-	*Stenotrema altispira*	Highland slitmouth	No known records on GWJNF. Grayson and Smyth Co records need to be verified.	Higher elevations, in leaf litter and woody debris.	S	G3	S1	-
10	-	-	*Ventridens decussatus*	Crossed dome	No known records on GWJNF. Scott Co records need to be verified.	High elevations, usually >3000', in leaf litter, particularly oak leaves.	S	G3	SU	-
10	-	-	*Vertigo bollesiana*	Delicate vertigo	No known records on GWJNF. VA and WV records need to be verified.	Leaf litter often under shrubs, on cliff-face ledges and boulder tops in mesic upland forest, and damp microsites in northern white cedar wetlands.	S	G4	SU	-
1	X	-	*Vertigo clappi*	Cupped vertigo	Greenbrier, Pendelton Cos, WV	Well-rotted, humid leaf litter and fine soil on shaded boulders, talus, ledges, and bases of forested lime-rich bedrock outcrops.	S	G1G2	S1S2	SH
Mussel (Mollusk, Class Bivalvia)										
1	-	X	*Alasmidonta marginata*	Elktoe	Greenbrier R and New R, WV. Upper New R; Reed Ck; Sinking Ck (Giles Co); Wolf Ck (Bland Co); Upper S Fk Holston; Historical Upper Clinch.	Aquatic-rivers.	S	G4	S1S2	S2
1	X	-	*Alasmidonta varicosa*	Brook floater	Potomac drainage	Aquatic-rivers.	S	G3	S1	S2
1	-	X	*Alasmidonta viridis*	Slippershell mussel	Historic in Upper Clinch R excluding Copper Ck where extant; Upper S Fk Holston	Aquatic-rivers.	S	G4G5	S1	-
1	-	X	*Cyprogenia stegaria*	Fanshell	Lower Clinch R, Scott Co	Aquatic-rivers. Synonym: *Cyprogenia irrorate.*	E	G1Q	S1	S1
1	-	X	*Dromus dromas*	Dromedary pearlymussel	Clinch R, Powell R, N Fk Holston R	Aquatic-rivers.	E	G1	S1	-
1	X	X	*Elliptio lanceolata*	Yellow lance	Critical Habitat: ~14 River mile (22.5 km) Johns Ck, Craig Co; Roanoke R, James R	Aquatic-streams.	T	G2	S2	-
1	-	X	*Epioblasma brevidens*	Cumberlandian combshell	Clinch R, Powell R, N Fk Holston R. Critical Habitat: the mainstem Clinch R, Indian Ck, and Copper Ck.	Aquatic-rivers.	E	G1	S1	-
1	-	X	*Epioblasma capsaeformis*	Oyster mussel	Clinch R, Powell R, N Fk Holston R. Critical Habitat: the mainstem Clinch, Powell R, Indian Ck, and Copper Ck.	Aquatic-rivers.	E	G1	S1	-
1	-	X	*Epioblasma florentina aureola*	Golden riffleshell	Restricted to lower 1.0 mile of Indian Ck to Clinch R. All other historical populations in M and Upper Tennessee R system now extirpated.	Aquatic-rivers. Also, Tan riffleshell.	E	G1T1	S1	-
1	-	X	*Epioblasma torulosa gubernaculum*	Green-blossom Pearlymussel	Clinch R, N Fk Holston R	Aquatic-rivers.	E	G2TX	SX	-
1	-	X	*Epioblasma triquetra*	Snuffbox	Clinch R, Powell R, N Fk Holston R	Aquatic-rivers.	E	G3	S1	S2
1	-	X	*Fusconaia cor*	Shiny pigtoe	Clinch R, Powell R, N Fk Holston R, Copper Ck	Aquatic-rivers. Synonym: *Fusconaia edgariana.*	E	G1	S1	-
1	-	X	*Fusconaia cuneolus*	Fine-rayed pigtoe	Clinch R, Powell R, Copper Ck, Little R	Aquatic-rivers.	E	G1	S1	-
1	-	X	*Fusconaia masoni*	Atlantic pigtoe	Roanoke R, Craig Ck drainage	Aquatic-rivers. Synonym: *Lexingtonia subplana.*	PT	G1	S2	-

OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
1	-	X	*Hemistena lata*	Cracking pearlymussel	Clinch R, Powell R	Aquatic-rivers. Synonym: *Lastena lata.*	E	G1	S1	-
1	-	X	*Lampsilis abrupta*	Pink mucket	Clinch R	Aquatic-rivers. Synonym: *Lampsilis orbiculate.*	E	G2	SX	S1
1	X	-	*Lampsilis cariosa*	Yellow lampmussel	N Fk Shenandoah R; Shenandoah, Warren Cos	Aquatic-rivers.	S	G3G4	S2	S2
1	-	X	*Lasmigona holstonia*	Tennessee heelsplitter	Upper Clinch, N and M Fk Holston R drainages; Wolf Ck, Bland Co below Burkes Garden	Aquatic-streams.	S	G3	S1	-
1	X	-	*Lasmigona subviridis*	Green floater	Widely distributed in N and S Fk Shenandoah R, Pedlar R, James R	Aquatic-rivers.	S	G3	S2	S2
1	-	X	*Lemiox rimosus*	Birdwing pearlymussel	Clinch R, Powell R, Copper Ck, Little R	Aquatic-rivers. Synonym: *Conradilla caelata.*	E	G1	S1	-
1	-	X	*Margaritifera monodonta*	Spectaclecase	2 sites Clinch R	Aquatic-rivers. Synonym: *Cumberlandia monodonta.*	E	G3	S1	-
1	X	X	*Parvaspina collina*	James spinymussel	Potts Ck, Craig Ck, Johns Ck, Patterson Run, Pedlar R, Cowpasture R, Mill Ck (Deerfield)	Aquatic-rivers. Synonym: *Pleurobema collina*.	E	G1	S1	S1
1	-	X	*Pegias fabula*	Little-winged pearlymussel	Clinch R, N Fk Holston R, S Fk Holston R, Little R	Aquatic-streams.	E	G1	S1	-
1	-	X	*Plethobasus cyphyus*	Sheepnose	Clinch R, Powell R	Aquatic-rivers.	E	G3	S1	S2
1	-	X	*Pleurobema cordatum*	Ohio pigtoe	Clinch R	Aquatic-rivers.	S	G4	S1	S2
1	-	X	*Pleurobema oviforme*	Tennessee clubshell	Clinch R, Powell R, N, Middle, S Fk Holston R	Aquatic-streams.	S	G1G3	S2S3	-
1	-	X	*Pleurobema plenum*	Rough pigtoe	Clinch R	Aquatic-rivers.	E	G1	SH	SH
1	-	X	*Pleurobema rubrum*	Pyramid pigtoe	Upper Clinch R	Aquatic-rivers. Synonym: *Pleurobema pyramidatum.*	S	G2G3	SH	-
1	-	X	***Pleuronaia barnesiana***	Tennessee pigtoe	Clinch R, Powell R, N Middle, S Fk Holston R	Aquatic-rivers. Synonym: *Fusconaia barnesiana.*	S	G2G3	S2	-
1	-	X	*Pleuronaia dolabelloides*	Slabside pearlymussel	Clinch R, M Fk Holston, N Fk Holston R. Critical Habitat: N and M Fk Holston R, VA: Big Moccasin Ck, VA: Clinch R, TN, VA: Powell R, TN, VA	Aquatic-rivers. Synonym: *Lexingtonia dolabelloides.*	E	G2	S2	-
1	-	X	*Ptychobranchus subtentum*	Fluted kidneyshell	Holston R, Powell R, Indian R, Clinch R, Little R, Copper Ck, Big Moccasin Ck. Critical Habitat: Indian Ck, VA: N and M Fk Holston R, VA: Big Moccasin Ck, VA: Copper Ck, VA; Clinch R, TN, VA: Powell R, TN, VA	Aquatic-rivers.	E	G2	S2	-
1	-	X	*Theliderma cylindrica strigillata*	Rough rabbitsfoot	Clinch R, Powell R, N Fk Holston R, Copper Ck. Critical Habitat: the mainstem Clinch and Powell R, Indian Ck, and Copper Ck.	Aquatic-streams. Synonym: *Quadrula cylindrica strigillata.*	E	G3G4T2	S2	-
1	-	X	*Theliderma intermedia*	Cumberland monkeyface	Powell R	Aquatic-rivers. Synonym: *Quadrula intermedia.*	E	G1	S1	-
1	-	X	*Theliderma sparsa*	Appalachian monkeyface	Clinch R, Powell R	Aquatic-rivers. Synonym: *Quadrula sparsa.*	E	G1	S1	-
1	-	X	*Toxolasma lividum*	Purple lilliput	N Fk Holston R, Clinch R	Aquatic-rivers. Synonyms: *Carunculina glans, Carunculina lividus.*	S	G3Q	SH	-
1	-	X	*Venustaconcha trabalis*	Tennessee bean	Clinch R, Copper Ck. Critical Habitat: mainstem Clinch and Powell R, Indian Ck, and Copper Ck.	Aquatic-rivers. Also, Purple bean. Synonym: *Villosa perpurpurea*.	E	G1	S1	-
1	-	X	*Venustaconcha troostensis*	Cumberland bean	Clinch R	Aquatic-rivers. Synonym: *Villosa trabalis*.	E	G1	S1	-

OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
Spider (Arachnid)										
2	-	X	*Microhexura montivaga*	Spruce-fir moss spider	Whitetop Mtn	Damp, well-drained moss and liverwort mats on boulders in mature spruce-fir forests.	E	G2	S1	-
Amphipod (Crustacean, Order Amphipoda)										
1	-	X	*Stygobromus abditus*	James Cave amphipod	James, Sam Bells caves, Pulaski Co; Watsons cave, Wythe Co; and other New River caves.	Aquatic-caves, water well.	S	G2G3	S3	-
1	-	X	*Stygobromus emarginatus*	Greenbrier Cave amphipod	Greenbrier, Monroe Cos, WV	Aquatic-caves. In caves under gravel in streambeds, occasionally in pools. Most abundant in smallest trickles of water. Primarily in tiny first and second order headwater cave streams.	S	G3	-	S3
1	X	-	*Stygobromus gracilipes*	Shenandoah Valley cave amphipod	Frederick, Rockingham, Shenandoah, Warren Cos	Aquatic-caves.	S	G3G4	S3	S1
1	X	-	*Stygobromus hoffmani*	Alleghany County cave amphipod	Low Moor cave (non-FS), Alleghany Co	Aquatic-caves, groundwater habitats including springs and seeps.	S	G2	S2	-
1	X	-	*Stygobromus mundus*	Bath County cave amphipod	Alleghany, Bath Cos	Aquatic-caves.	S	G2G3	S1S2	-
1	-	X	*Stygobromus pollostus*	Least Cave stygobromid	Greenbrier, Monroe Cos, WV	Aquatic-caves.	S	G2G3	-	S1
1	-	X	*Stygobromus spinatus*	Spiny Cave stygobromid	Southern Monroe Co, north-northeast to central Pocahontas, Co, WV, primarily within the Greenbrier Valley. Covers a linear distance of ~67 miles.	Aquatic-caves. In gravels of small streams and in small cave pools.	S	G2G3	-	S2
Isopod (Crustacean, Order Isopoda)										
10	-	-	*Antrolana lira*	Madison Cave Isopod	No known records on GWJNF. Documented population centers in Waynesboro-Grottoes area, Augusta Co; Harrisonburg area, Rockingham Co; valley of main stem of Shenandoah R, Warren Co, VA: Jefferson Co, WV.	Aquatic-subterranean obligate in caves and karst groundwater.	T	G2G4	S2	S1
1	-	X	*Caecidotea incurva*	Incurved cave isopod	McCullin Cave, Smyth Co; Groseclose Cave No. 1, Wythe Co	Aquatic-caves.	S	G2G4	S2	-
1	X	X	*Miktoniscus racovitzai*	Racovitza's terrestrial cave isopod	Alleghany, Botetourt, Page, Rockbridge, Shenandoah Cos	Aquatic-caves.	S	G3G4	S2	-
Crayfish (Crustacean, Order Decapoda)										
1	-	X	*Cambarus callainus*	Big Sandy crayfish	In VA, Upper Russell Fk drainage Big Sandy R	Aquatic-streams. Fast flowing streams of moderate width. Synonym: *Cambarus veteranus*.	T	G2	S1S2	S1
Centipede (Insect, Order Chilopoda)										
1	X	X	*Escaryus cryptorobius*	Montane centipede	The Priest, Nelson Co; Whitetop Mtn, near junction of Grayson, Washington, Smyth Co	Upper soil horizon, spruce-birch forests.	S	G2	S2	-
1	-	X	*Escaryus orestes*	Whitetop Mountain centipede	Whitetop Mtn, near junction of Grayson, Washington, Smyth Co	Dark moist soil and litter, spruce-birch forests.	S	G1	S1S2	-
Springtail (Insect, Order Collembola)										

OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
1	X	-	*Pygmarrhopalites sacer*	A cave springtail	Bath Co	Caves.	S	G2	S2	-
Dragonfly (Insect, Order Odonata)										
1	X	X	*Hylogomphus viridifrons*	Green-faced clubtail	New R, Craig Ck, Pound R, Locust Spring	Aquatic-rivers. Synonym: *Gomphus viridifrons*.	S	G3G4	S2	S3
1	-	X	*Ophiogomphus howei*	Pygmy snaketail	Upper New R; Carroll, Grayson, Wythe Cos	Aquatic-rivers.	S	G3	S1S2	-
Stonefly (Insect, Order Plecoptera)										
2	-	X	*Allocapnia fumosa*	Smokies snowfly	High elevation rheocrenes (flowing springs) of Mt Rogers. Grayson, Smyth Cos	Aquatic-streams.	S	G2	S1S2	-
2	-	X	*Megaleuctra williamsae*	Smokies needlefly	Mt Rogers and Whitetop Mtn	Aquatic-streams.	S	G3	S1S2	-
6	-	X	*Taeniopteryx nelsoni*	Cryptic willowfly	Lewis Fk and Grindstone Branch N of Mt Rogers	Aquatic-streams.	S	G1	S2	-
Beetle (Insect, Order Coleoptera)										
2	X	X	*Cicindela patruela*	Northern barrens tiger beetle	Blue Ridge, Ridge & Valley	Eroded slopes of exposed sandstone and conglomerate.	S	G3	S2	S2S3
1	-	-	*Pseudanophthalmus avernus*	Avernus Cave beetle	Endemic to Endless Caverns (commercial cave, non-FS) Rockingham Co.	Caves.	S	G1	S1	-
1	-	X	***Pseudanophthalmus cordicollis***	Little Kennedy Cave beetle	Franklins Pit, Little Kennedy Cave, Omega Cave System, Wildcat Saltpetre Cave, Wise Co, VA	Caves.	S	G1	S1	-
1	X	-	*Pseudanophthalmus intersectus*	Crossroads Cave beetle	Known only from Crossroads Cave, Millboro Springs, Bath Co.	Caves.	S	G1G2	S1	-
Scorpionfly (Insect, Order Mecoptera)										
1	-	X	*Brachypanorpa jeffersoni*	Jefferson's short-nosed scorpionfly	Sugar Run Mtn, Giles Co; Whitetop Mtn, Smyth Co	Moist soil around seeps. Only known from high elevation. Larvae use short burrows in loose soil and moss.	S	G2	S1S2	-
Butterfly, Skipper, Moth (Insect, Order Lepidoptera)										
1	-	X	*Atrytone arogos*	Arogos skipper	Historic records, Blacksburg area. Caldwell Fields records need to be verified.	Relatively undisturbed grasslands, prairies, sand prairies, serpentine barrens, grassland/herbaceous, old field. Larval host plant; big bluestem *Andropogon gerardi.*	S	G2G3T1	SH	-
1	X	X	*Calephelis borealis*	Northern metalmark	Alleghany, Augusta, Bath, Botetourt, Craig, Lee, Montgomery, Russell, Scott Cos: Historic records from Giles, Rockbridge Cos.	Openings within forested or wooded areas, natural outcrops, shale or limestone barrens, glades or powerline right-of-ways. Larvae host plant; round-leaf ragwort, *Senecio obovatus.*	S	G3	S3	S1
1	X	X	*Callophrys irus*	Frosted elfin	Frederick, Montgomery, Page, Roanoke Cos	Dry, open woods, clearings, and road/powerline; powerline rights-of-way with abundant wild indigo, *Baptisia* spp. or wild lupine, *Lupinus perennis*. Synonym: *Incisalia irus*.	S	G3	S2?	S1
6	X	X	*Danaus plexippus*	Monarch	Blue Ridge, Ridge & Valley	Mixed hardwood/conifer forest; shrubland; grassland/herbaceous; old field; suburban/orchard; cropland/hedgerow. Larval host plant; milkweeds *Asclepias* spp.	S	G4	S4	S2B

OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
1	X	X	*Erora laeta*	Early hairstreak	Bedford, Botetourt, Page, Rockbridge, Warren, Wise Cos, VA; Monroe, Pendleton Cos, WV. Historic records from Giles, Montgomery Cos.	Hardwood forests or hardwood-northern conifer mixed forests. Larval host food, young fruit of American beech, *Fagus grandifolia*, nuts of beaked hazelnut, *Corylus cornuta*. Canopy dweller.	S	G2G3	S2	S2
6	X	X	*Speyeria idalia*	Regal fritillary	Blue Ridge, Ridge & Valley	Riparian, grasslands-shrublands. Larval host plant, violets, *Viola* spp.	S	G3?	SH	SH
1	X	X	*Erynnis martialis*	Mottled duskywing	Historic records from Augusta, Bedford, Botetourt, Craig, Montgomery, Rockbridge Cos; St. Mary's R near entrance to Wilderness Area, Augusta Co.	Open woodland; barrens; open brushy fields. Larval host plant; New Jersey tea, *Ceanothus americanus*.	S	G3	S1S3	S1
2	X	X	*Erynnis persius persius*	Persius duskywing	Blue Ridge, Ridge & Valley	Bogs, wet meadows, open seepages in boreal forests. Larval host plant; lupine, *Lupinus perennis*, wild indigo, *Baptisia tinctoria*.	S	G5T1T3	SH	-
1	X	-	*Pyrgus centaureae wyandot*	Appalachian grizzled skipper	Historic records from Augusta, Bath, Frederick, Giles, Highland, Montgomery, Roanoke Cos. Post 1992 records include, Alleghany, Botetourt, Craig, Page, Pulaski, Rockbridge, Rockingham, Shenandoah Cos. Current known extant population(s), JRRD, Ruffed Grouse Management Area, Alleghany Co and adjacent private land.	Shale barrens, open shaley oak woodlands, powerline rights-of-way. Larval host plant; cinquefoil, *Potentilla* spp, strawberry, *Fragaria virginina.* Synonym: *Pyrgus wyandot.*	S	G5T1T2	S1	S1
1	X	X	*Catocala herodias gerhardi*	Herodias underwing	Bald Knob, Bath Co; Poverty Hollow, Montgomery Co; Sand Mtn, Wythe Co (non-FS)	Pitch pine/bear oak scrub woodlands, >3000'. Larval host plant; oak, *Quercus* spp. Also, Pine Barrens Underwing.	S	G3T3	S2S3	SU
1	-	X	*Catocala marmorata*	Marbled underwing	Montgomery Co	Mesic montane hardwood forests; Forested wetland, riparian. Larval host plants; willows/cottonwoods, *Salix/Populus*.	S	G3G4	S2	-
1	X	X	*Euchlaena milnei*	Milne's euchlaena moth	Warm Springs Mtn, Catawba Ck Slopes, Sweet Spring Hollow, Salt Pond Mtn. (Doe Ck)	Moist, forested slopes of mixed pine hardwoods. Acidic oak woods.	S	G2G4	S2	S1
Bee (Insect, Order Hymenoptera)										
10	X	X	*Bombus affinis*	Rusty-patched bumble bee	Confirmed populations with HPZs, LPZs, or both in Bath, Highland, Augusta, Rockingham, Warren Cos, VA; Greenbrier, Pendleton, Pocahontas, Hardy Cos, WV. Historic records from Carroll, Frederick, Giles, Grayson, Montgomery, Nelson, Page, Pulaski, Rockbridge, Wythe Cos, VA; Monroe, Hampshire, Cos, WV	Habitat generalist: grasslands, old field, mature woods, open woodlands, mixed farmland edges, marshes, powerline rights-of-way, urban areas. Feeds from a variety of plants for pollen and nectar, including flowering rhododendron and mountain laurel. Nest sites include abandoned rodent burrows, fallen dead wood, stumps. Queen only overwinters.	E	G2	S1	S1
NON-VASCULAR PLANT										
Lichen										
2	-	X	*Alectoria fallacina*	Witch's-hair lichen	Smyth, Grayson Co	S. Appalachian endemic. Conifer trees, especially fir rarely on birch, in spruce-fir forests; rarely fire cherry communities.	S	G2	SH	SNR
2	-	X	*Gymnoderma lineare*	Rock gnome lichen	Whitetop Mtn	Spruce-fir forests.	E	G3	S1	-
2	X	X	***Heterodermia appalachensis***	Appalachian fringe lichen	St. Mary's Wilderness, Augusta Co; Skidmore Fork, Rockingham Co; Browns Run, Page Co; rock outcrop, 6 mi. SE of Edinburg, Page Co; summit of Whitetop Mtn, Washington Co.	Bark of hardwoods, occasionally on shaded rocks.	S	G2?	S1	-
2	-	X	*Heterodermia erecta*	A foliose lichen	Along Whitetop Mtn access road, 1.2 mile from summit, Grayson Co, VA.	S. Appalachian endemic.	S	G1?	S1	-

OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
2	-	X	*Hypotrachyna oostingii*	Oosting's loop lichen	Mount Rogers, on Smyth, Grayson Co line	Spruce-fir forests.	S	G2?	SH	-
2	-	X	*Hypotrachyna virginica*	Virginia hypotrachyna lichen	Mt Rogers and Whitetop Mtn	Spruce-fir forests. Found on spruce, fir, rhododendron in spruce-fir and fire-cherry communities in S. Appalachian Mtns. Typically, at higher elevations, has been found at lower elevations.	S	G1G2	SH	SNR
2	-	X	*Lecanora masana*	A lichen	Whitetop Mtn and Grayson, Smyth Cos	S. Appalachian endemic. Spruce-fir, northern hardwood-conifer forest.	S	GNR	-	-
1	X	-	*Melanelia culbersonii*	Appalachian camouflage lichen	Massanutten (Fridley watershed), Rockingham Co; along trail from Wolf Gap Campground to Big Schloss, Shenandoah Co.	Rocks in open areas and on talus slopes. Fully exposed, minimally weathered quartzite and sandstone boulderfields at elevations from about 1000-3300 ft. Also, Culberson's black-parmelia.	S	G2G4	S2	-
Liverwort										
2	-	X	*Bazzania nudicaulis*	A liverwort	Mt Rogers and Whitetop Mtn	Bark and rock outcrops in spruce-fir forests.	S	G2G3	S1	-
1	X	-	*Cephaloziella spinicaulis*	A liverwort	Along SR 33, 10 miles W of Harrisonburg.	Damp soil in crevices of shaded sedimentary rocks, in hemlock-hardwoods forest and humid to dry faces of ledges and cliffs in open oak-hickory forest.	S	G2G3	S1	-
2	-	X	*Leptoscyphus cuneifolius*	Wedge flapwort	Grayson Co	Bark of Fraser fir.	S	G4G5T4T5	SH	-
6	-	X	*Nardia lescurii*	A liverwort	Blue Ridge, Ridge & Valley	Riparian - on peaty soil over rocks, usually in shade and associated with water, <3000'.	S	G3?	S1	-
2	-	X	*Plagiochila austinii*	A liverwort	Little Stony Ck – Cascades; Red Ck on Beartown Mtn	Rich, moist, densely forested ravines; shaded outcrops.	S	G3	S?	-
2	-	X	*Plagiochila corniculata*	A liverwort	Grayson, Smyth Cos	Limited to densely shaded, humid, often fog-enshrouded mountain summits, usually to the spruce-fir association. Most commonly found on Fraser fir.	S	G4?	SNR	-
2	-	X	*Plagiochila sullivantii var. sullivantii*	A liverwort	Whitetop Mtn, Salt Pond Mtn	Moist shaded rock outcrops, under cliff ledges, in crevices.	S	G2T2	SNR	-
1	X	X	*Plagiochila virginica*	A liverwort	Bath, Giles, Highland, Roanoke Cos	S. Appalachian endemic. Damp to intermittently dry calcareous or sandstone ledges or cliffs in partially exposed sites.	S	G3	SNR	SNR
2	X	X	*Radula tenax*	A liverwort	Alleghany, Amherst, Dickenson, Giles, Highland, Nelson, Smyth, Washington Cos	Moist rocks or trees in mountains below spruce-fir zone; Depressed, dense mats on moist rocks, less frequently on tree trunks, in mountainous and hilly regions. Two discrete modes of occurrence: on shaded, damp rocks, and on tree bark in deep, moist forests. Does not tolerate submersion.	S	G3G4	SU	SNR
2	-	X	*Sphenolobopsis pearsonii*	Horsehair threadwort	Mt Rogers and Whitetop Mtn	Bark of Fraser fir, mountain ash, occasionally on red spruce, >5000'.	S	G2?	S1	-
Moss										
2	-	X	*Sphagnum flavicomans*	Northeastern peatmoss	Whitetop Mtn	Bogs, seeps.	S	G3	SU	-
VASCULAR PLANT										
2	-	X	*Abies fraseri*	Fraser fir	Grayson, Smyth Cos	S. Appalachian endemic. Spruce–fir forests, bogs, >5000'.	S	G2	S1	SNA
	X	X	*Aconitum reclinatum*	Trailing white monkshood	Blue Ridge, Ridge & Valley	Rich cove sites, streambanks, seepages; all with high pH.	S	G3G4	S3	S3

OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
1	-	X	*Actaea rubifolia*	Appalachian black cohosh	Lower Clinch R watershed, Scott, Wise Cos	Moist, rich wooded bluffs over limestone.	S	G3	S1	-
1	X	X	*Allium oxyphilum*	Shale barren nodding onion	Monroe, Summers, Mercer, Greenbrier Cos, WV	Shale barrens, sandstone glades.	S	G2	S1	S2
1	X	-	*Arabis patens*	Spreading rockcress	Frederick, Lee, Page, Shenandoah, Warren Cos, VA; Hampshire, Hardy, Pendleton Cos, WV	Shaded, calcareous cliffs, bluffs, and talus slopes.	S	G3	S1	S2
2	X	X	*Berberis canadensis*	American barberry	Blue Ridge, Ridge & Valley	Calcareous open woods, bluffs, cliffs, and along fencerows.	S	G3	S3S4	S1
1	-	X	*Betula uber*	Virginia round-leaf birch	One location: Cressy Ck, Smyth Co.	Riparian, mixed open forest, usually disturbed sites.	T	G1Q	S1	-
1	X	-	*Boechera serotina*	Shale barren rockcress	Ridge & Valley N of James R watershed	Shale barrens and adjacent open oak woods. Synonym: *Arabis serotina.*	E	G2	S2	S2
1	X	-	*Boltonia montana*	Mountain doll's-daisy	Augusta Co	Sinkhole ponds. Also, Valley doll's-daisy.	S	G1G2	S1	-
1	-	X	*Botrychium jenmanii*	Alabama grapefern	Russell, Wise Cos	Open woods, old fields, pastures. Synonym: *Sceptridium jenmanii.*	S	G3G4	SH	-
2	X	X	*Buckleya distichophylla*	Piratebush	Blue Ridge S of Roanoke R, Ridge & Valley S of James R	Open oak and hemlock woods.	S	G3	S2	-
	-	X	*Cardamine clematitis*	Mountain bittercress	Blue Ridge, Ridge & Valley, S of New R watershed	Riparian, spring seeps, rocky streamsides.	S	G3	S1	-
1	X	X	*Carex polymorpha*	Variable sedge	Blue Ridge, Ridge & Valley, N of James R	Open acid soil, oak-heath woodlands, responds positively to fire.	S	G3	S2	S1
	X	X	*Carex schweinitzii*	Schweinitz's sedge	Augusta, Bath, Highland, Montgomery, Pulaski, Washington Cos	Bogs, limestone fens, marl marshes.	S	G3G4	S1	-
	-	X	*Chelone cuthbertii*	Cuthbert turtlehead	Blue Ridge Plateau, Grayson, Carroll Cos	Bogs, wet meadows, boggy woods and thickets.	S	G3	S2	-
1	-	X	*Cleistesiopsis bifaria*	Small spreading pogonia	Craig, Dickenson, Scott, Wise Cos	Well drained, rather open, scrubby hillsides, oak-pine-heath woodlands, acidic soils. Synonym: *Cleistes bifaria.*	S	G4?	S2	S1
1	-	X	*Clematis addisonii*	Addison's leatherflower	Montgomery, Roanoke, Botetourt, Rockbridge Cos	Open glades and rich woods over limestone and dolostone.	S	G1?	S1?	-
2	X	X	*Clematis coactilis*	Virginia white-haired leatherflower	Ridge & Valley, Rockbridge Co, S to Wythe Co	Shale barrens, rocky calcareous woodlands.	S	G3	S3	-
1	X	-	*Clematis viticaulis*	Millboro leatherflower	Endemic to VA, only in Bath, Rockbridge Cos.	Shale barrens, open shaly woodlands.	S	G1	S1S2	-
1	X	X	*Corallorhiza bentleyi*	Bentley's coralroot	Alleghany, Bath, Giles Cos, VA; Monroe, Pocahontas Cos, WV	Dry, acid woods, along roadsides, well-shaded trails.	S	G2	S2	S1
2	X	X	*Delphinium exaltatum*	Tall larkspur	Blue Ridge, Ridge & Valley	Dry calcareous soil in open grassy glades or thin woodlands.	S	G3	S3	S2
1	X	X	*Echinacea laevigata*	Smooth coneflower	Alleghany, Montgomery Cos	Open woodlands and glades over limestone or dolomite.	E	G2G3	S2	-
1	X	-	*Echinodorus tenellus*	Dwarf burhead	Pines Chapel Pond, Augusta Co	Pond margins, wet depressions in sandy soil.	S	G5?	S1	-
	X	X	*Euphorbia purpurea*	Glade spurge	Blue Ridge, Ridge & Valley	Rich, swampy woods, seeps and thickets.	S	G3	S2	S2

OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
1	X	X	*Gaylussacia brachycera*	Box huckleberry	Alleghany, Bath, Bland, Carroll, Craig, Dickenson, Montgomery Cos	Dry, acidic forests, woodlands of oaks, pines, and other heaths.	S	G3	S1	S2
1	X	X	*Gymnocarpium appalachianum*	Appalachian oak fern	Alleghany, Augusta, Bath, Highland, Page, Rockbridge, Rockingham, Warren Cos	Maple-birch-hemlock woods on mountain slopes and summits, moist sandstone, talus slopes, or bouldery colluvium. Requires cool, moist microclimate, typically on north-facing slopes with cold air seepage, >2000'.	S	G3	S3	S2
1	X	-	*Helenium virginicum*	Virginia sneezeweed	Endemic to Augusta, Rockingham Cos.	Seasonally dry meadows and sinkhole depressions.	T	G3	S2	-
1	X	-	*Helonias bullata*	Swamp-pink	Augusta, Nelson Cos	Sphagnum bogs, seeps, and streamsides.	T	G3	S2S3	-
1	X	-	*Heuchera alba*	White alumroot	Shenandoah Mtn	High elevation rocky woods and bluffs.	S	G2Q	S1	S2
	X	X	*Ilex collina*	Long-stalked holly	Blue Ridge, Ridge & Valley	Bogs, seep, shrubby streamheads, >3100'.	S	G3	S1	S2
1	-	X	*Iliamna corei*	Peter's Mountain-mallow	One location: Narrows, Peters Mtn, Giles Co.	Rich, open woods along sandstone outcrops, soil pockets, fire maintained.	E	G1	S1	-
2	X	X	*Isotria medeoloides*	Small whorled pogonia	In mountains of VA, known only from Bedford, Craig, and Lee Cos; other VA occurrences in Piedmont and Coastal Plain.	Open, mixed hardwood forests on level to gently sloping terrain with north to east aspect.	T	G2G3	S2	S1
	X	X	*Juglans cinerea*	Butternut	Blue Ridge, Ridge & Valley	Well-drained bottomland and floodplain, rich mesophytic forests, mostly along toe slopes.	S	G3	S3?	S3
2	X	X	*Liatris helleri*	Heller's blazing star	Blue Ridge, Ridge & Valley	Shale barrens, mountain hillside openings. Also, Turgid gayfeather. Synonym: *Liatris turgida.*	S	GNR	S3	SNR
2	-	X	*Lilium grayi*	Gray's lily	Blue Ridge, Mt Rogers and Whitetop Mtn; Occurrences north of Floyd Co questionable.	Bogs, open seeps, wet meadows, grassy balds.	S	G1G2	S2	-
2	X	X	*Monotropsis odorata*	Sweet pinesap	Blue Ridge, Ridge & Valley	Dry oak-pine-heath woodlands, soil usually sandy.	S	G3	S3	S1
1	-	X	*Packera millefolium*	Yarrow-leaved ragwort	Lee, Scott Cos	Open limestone outcrops and cedar barrens. Also, Piedmont ragwort.	S	G3	S2	-
2	X	X	*Parnassia grandifolia*	Largeleaf grass-of-Parnassus	Augusta, Bland, Giles, Grayson, Lee, Montgomery, Russell, Washington, Wythe Cos	Fens, thinly wooded, gravelly seeps over limestone, dolomite, amphibolite, and ultramafic rocks; restricted to calcareous or magnesium-rich soils.	S	G3	S2	S1
1	X	-	*Paxistima canbyi*	Canby's mountain-lover	Ridge & Valley, Sarver Barrens SBA, Craig Co	Calcareous cliffs and bluffs, usually undercut by stream. Synonym: *Pachistima canbyi.*	S	G2?	S2	S2
1	X	X	*Phemeranthus teretifolius*	Quill fameflower	Amherst, Augusta (W side of Blue Ridge, near Laurel Springs Gap, Humpback Mtn SBA), Bedford, Carrol, Craig (Bald Mtn SBA), Grayson, Montgomery, Nelson, Page, Roanoke, Rockingham, Warren Cos, VA; Hardy, Hampshire Cos, WV	Calcareous sandstone glades, metabasalt barrens. Also, Roundleaf fameflower. Synonym: *Talinum teretifolium*.	S	G4	S4	S1
2	X	X	*Phlox buckleyi*	Sword-leaf phlox	Blue Ridge, Ridge & Valley	Open, often dry oak woodlands and rocky slopes, usually over shale in humus rich soils, often along roadsides.	S	G2	S2	S2
	X	X	*Poa paludigena*	Bog bluegrass	Blue Ridge, Ridge & Valley	Shrub swamps and seeps, usually under shade.	S	G3G4	S2	S1
2	X	-	*Potamogeton hillii*	Hill's pondweed	Bath Co	Clear, cold calcareous ponds.	S	G3	S1	-
	X	-	*Potamogeton tennesseensis*	Tennessee pondweed	Ridge & Valley	Ponds, back water of streams and rivers.	S	G2G3	S1	S2

OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
1	X	X	*Pycnanthemum torreyi*	Torrey's mountain-mint	Bland, Bath, Giles, Rockbridge, Wythe Cos	Open, dry rocky woods, roadsides, and thickets near streams, heavy clay soil over calcareous rock.	S	G2	S2	S1
1	X	X	*Scirpus ancistrochaetus*	Northeastern bulrush	Ridge & Valley	Mountain ponds, sinkhole ponds in Shenandoah Valley.	E	G3	S2	S1
2	X	X	*Scutellaria saxatilis*	Rock skullcap	Blue Ridge, Ridge & Valley	Rich, dry to mesic ridgetop woods, 32 counties in VA, likely G4/S4.	S	G3G4	S3	S2
1	-	X	*Silene ovata*	Mountain catchfly	Dickenson, Lee, Wise Cos	Rich woodlands and forests over limestone.	S	G3	S1	-
	-	X	*Spiraea virginiana*	Virginia spiraea	Blue Ridge, Ridge & Valley, S of New R	Scoured banks of streams, riverside or island shrub thickets.	T	G2	S1	S1
1	X	X	*Thermopsis mollis*	Appalachian golden-banner	Amherst, Bath, Bedford, Botetourt, Montgomery, Rockbridge Cos	Dry, open forests, woodlands, and clearings. Also, Allegheny mountain golden-banner.	S	G3G4	S3	-
1	X	X	*Trifolium virginicum*	Kate's Mountain clover	Alleghany, Augusta, Bath, Botetourt, Craig, Frederick, Highland, Rockbridge, Rockingham, Shenandoah, Warren Cos	Shale barrens.	S	G3	S3	S3
2	-	X	*Tsuga caroliniana*	Carolina hemlock	Blue Ridge north to James R	Rocky ridges and slopes, usually dry and well drained.	S	G2G3	S3	-
2	X	X	*Vitis rupestris*	Sand grape	Ridge & Valley	Scoured banks of rivers and streams over calcareous bedrock.	S	G3	S1	S2

LEGEND FOR TES SPECIES LIST IN OCCURRENCE ANALYSIS RESULTS:

OAR CODES:

1 = Project located out of known species range.

2 = Lack of suitable habitat for species in project area.

3 = Habitat present, species was searched for during field survey, but not found.

4 = Species occurs in project area, but outside of activity area.

5 = Field survey located species in activity area.

6 = Species not seen during field survey, but possibly occurs in activity area based on habitat observed; or field survey not conducted when species is recognizable (time of year or time of day). Therefore assume presence and no additional surveys needed.

7 = Aquatic species or habitat known or suspected downstream of project/activity area, but outside identified geographic bounds of water resource cumulative effects analysis area (defined as point below which sediment amounts are immeasurable and insignificant).

8 = Aquatic species or habitat known or suspected downstream of project/activity area, but inside identified geographic bounds of water resource cumulative effects analysis area.

9 = Project occurs in a 6th level watershed included in the USFWS/FS T&E Mussel and Fish Conservation Plan (August 8, 2007 U.S. Fish & Wildlife Service concurrence on updated watersheds). Conservation measures

from the USFWS/FS T&E Mussel and Fish Conservation Plan applied.

10 = Historic records for this species only; or no known records on GWJNF; or species considered extirpated from Virginia/West Virginia.

11 = Habitat present within project area, species known or suspected to occur in activity area. However, project design and mitigation measures result in no effect or no impact for this species, since activities will occur when species is either dormant or not in the project area due to time of year activities will occur, and/or activities will not impact habitat components species are known to utilize for their life cycle needs. (NOTE: When using this code, the Biological Evaluation or Biological Assessment should include an explanation of the analysis used. *E.g.*, How are the impacts of the action limited temporally to not cause an impact when the species returns or breaks dormancy?)

SPECIES: The term "species" includes any subspecies of fish, wildlife or plants, and any distinct population segment of any species or vertebrate fish or wildlife, which interbreeds when mature (Endangered Species Act of 1973, as amended through the 100th Congress).

RANGE: The geographical distribution of a species. For use here "range" is expressed as where a species is known or expected to occur on or near the George Washington and Jefferson National Forests in terms of landform (feature name, physiographic province), political boundary (county name), or watershed (river, or stream name).

HABITAT: A place where the physical and biological elements of ecosystems provide a suitable environment and the food, cover and space resources needed for plant and animal livelihood (FSM 2605-91-8, pg. 10 of 13).

TES CODES:

T = Federally listed as Threatened

E = Federally listed as Endangered

P = Federally Proposed as Threatened or Endangered

S = Southern Region (R8) Sensitive species

GLOBAL RANK: Global ranks are assigned by a consensus of the network of natural heritage programs, scientific experts, NatureServe and The Nature Conservancy to designate a rarity rank based on the range-wide status of a species or variety. This system was developed by The Nature Conservancy and is widely used by other agencies and organizations as the best available scientific and objective assessment of taxon rarity and level of threat to its existence. The ranks are assigned after considering a suite of factors including number of occurrences, numbers of individuals, and severity of threats.

G1 = Extremely rare and critically imperiled with 5 or fewer occurrences or very few remaining individuals; or because of some factor(s) making it especially vulnerable to extinction.

G2 = Very rare and imperiled with 6 to 20 occurrences or few remaining individuals; or because of some factor(s) making it vulnerable to extinction.

G3 = Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range; or vulnerable to extinction because of other factors. Usually fewer than 100 occurrences are documented.

G4 = Common and apparently secure globally, although it may be rare in parts of its range, especially at the periphery.

G5 = Very common and demonstrably secure globally, although it may be rare in parts of its range, especially at the periphery.

GH = Formally part of the world's biota with the exception that may be rediscovered.

GX = Believed extinct throughout its range with virtually no likelihood of rediscovery.

GU = Possibly rare, but status uncertain and more data needed.

G? = Unranked, or, if following a ranking, ranking uncertain (ex. G3?).

G_G_ = The rank is uncertain, but considered to be within the indicated range (e.g., G2G4) of ranks (also T_T_).

G_Q = Taxon has a questionable taxonomic assignment, (e. g., G3Q) and may prove to be invalid upon further study.

G_T = Signifies the rank of a subspecies (e. g., G5T1 would apply to a subspecies of a species is demonstrably secure globally (G5) but the subspecies warrants a rank of T1, critically imperiled.)

GNR = A global conservation status rank has not been assigned to the species.

STATE RANK: The following ranks are used by the Virginia Department of Conservation and Recreation to set protection priorities for natural heritage resources. Natural Heritage Resources (NHRs) are rare plant and animal species, rare and exemplary natural communities, and significant geologic features. The criterion for ranking NHRs is the number of populations or occurrences, i.e. the number of known distinct localities; the number of individuals in existence at each locality or, if a highly mobile organism (e.g., sea turtles, many birds, and butterflies), the total number of individuals; the quality of the occurrences, the number of protected occurrences; and threats.

- **S1** – Extremely rare and critically imperiled with 5 or fewer occurrences or very few remaining individuals in Virginia; or of some factor(s) making it especially vulnerable to extirpation in Virginia.
- **S2** – Very rare and imperiled with 6 and 20 occurrences or few remaining individuals in Virginia; or with many individuals in fewer occurrences; or of some factor(s) making it vulnerable to extirpation in Virginia.
- **S3** – Rare to uncommon in Virginia with between 21 and 100 occurrences; may have fewer occurrences if found to be common or abundant at some of these locations; may be somewhat vulnerable to extirpation in Virginia.
- **S4** – Common and apparently secure in Virginia, although it may be rare in parts of its range.

- **SH** – Formerly part of Virginia's fauna/flora with some expectation that it may be recovered; generally applies to species that have not been verified in Virginia for an extended period (usually > 15 years) and for which some inventory has been attempted recently.
- **SX** – Believed to be extirpated from Virginia with virtually no likelihood of rediscovery.
- **SU** – Possibly rare, but status uncertain and more data needed. Currently unrankable, due to lack of information or due to substantially conflicting information about status or trends; often because of low search effort or cryptic nature of the element.
- **S#B** – Breeding status of an animal (primarily used for birds/butterflies) in Virginia; these species typically inhabit Virginia only during the breeding season.
- **S#B/S#N** – Breeding and non-breeding status of an animal (primarily used for birds) in Virginia, when they differ.
- **SNA** – A conservation status rank not applicable because the species is not a suitable target for conservation activities in Virginia (includes accidental species, transients, exotics etc.).
- **SNR** – A state conservation status rank has not been assigned to the species.

These ranks should not be interpreted as legal designations.